

Application No.: 09/616606

Docket No.: MIT-003RCE

**AMENDMENTS TO THE CLAIMS**

1. (Currently Amended) An imaging system for imaging a target in three dimensions, the system comprising:  
a light projection source for projecting a beam of light onto the target;  
an image acquisition subsystem for acquiring at least two images from light reflected by the target, the image acquisition subsystem comprising a moveable aperture; and  
a correlation processor for processing the acquired images according to a sparse array image correlation process.
2. (Currently Amended) The imaging system of Claim 1 wherein the image acquisition subsystem comprises a lens, an aperture element and a camera disposed along an optical axis and wherein the aperture element defines ~~includes~~ an opening offset from the optical axis and the image acquisition subsystem further includes rotation means for rotating the aperture element about the optical axis such that the at least two images are acquired sequentially from different angles.
3. (Canceled).
4. (Canceled).
5. (Currently Amended) The imaging system of Claim 1 wherein the image acquisition subsystem comprises a lens, an aperture element and a camera disposed along an optical axis and wherein the camera includes a single CCD element.
- 6 (Original) The imaging system of Claim 1 wherein the light projection source includes a diffuser for projecting a beam of light having a random pattern.
7. (Currently Amended) An imaging method for imaging a target in three dimensions, the method comprising:  
projecting a beam of light onto the target;  
acquiring at least two images from light reflected by the target through a lens, an aperture element defining a moveable aperture and a camera disposed along an optical axis;  
and  
processing the acquired images according to a sparse array image correlation process.
8. (Currently Amended) The imaging method of Claim 7 wherein the aperture element defines ~~includes~~ an opening offset from the optical axis and acquiring further includes

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rotating the aperture element about the optical axis such that the at least two images are acquired sequentially from different angles.

9. (Original) The imaging method of Claim 7 wherein projecting includes projecting a beam of light having a random pattern.

10. (Original) In an imaging system having a lens, an aperture element and a camera disposed along an optical axis, an imaging method for imaging a target in three dimensions, the method comprising:

projecting a beam of light onto the target;

rotating the aperture element such that an opening of the aperture element offset from the optical axis is set to a first position;

acquiring a first image at the camera from light reflected by the target through the lens and the aperture opening at the first position;

rotating the aperture element such that an opening of the aperture element offset from the optical axis is set to a second position;

acquiring a second image at the camera from light reflected by the target through the lens and the aperture opening at the second position;

processing the acquired images according to an image correlation process to resolve three dimensional components of the target.

11. (Original) The imaging method of Claim 10 wherein the processing includes processing the acquired images according to a sparse array image correlation process.

12. (Original) The imaging method of Claim 11 wherein the sparse array image correlation process includes forming first and second image arrays of pixel values from the respective first and second images, each pixel value associated with one of a number of pixels, selecting pixel values in the image arrays which are beyond a pixel threshold value, and performing a correlation process on the selected pixel values comprising creating first and second sparse image arrays of the selected pixel values and their locations in the respective first and second image arrays, performing individual correlations successively between pixel entries of the first sparse image array and pixel entries of the second sparse image array within a pixel distance of each other, and cumulating the correlations in a correlation table at respective distance entries.

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13. (Original) The imaging method of Claim 11 wherein the processing further includes recursive correlation.

14. (Original) The imaging method of Claim 13 wherein the processing further includes correlation error correction.

15. (Original) The imaging method of Claim 14 wherein the processing further includes sub-pixel resolution processing.

16. (Currently Amended) An imaging system for imaging a target in three dimensions, the system comprising:

a light projection source for projecting a beam of light onto the target;

B1 | an image acquisition subsystem for acquiring at least two images from light reflected by the target, the subsystem comprising a lens, an aperture element and a CCD element disposed along an optical axis wherein the aperture element defines ~~includes~~ an opening offset from the optical axis and the image acquisition subsystem further includes rotation means for rotating the aperture element about the optical axis such that the at least two images are acquired at the CCD element sequentially from different angles;

a correlation processor for processing the acquired images according to an image correlation process.

17. (Original) The imaging system of Claim 16 wherein the correlation processor provides processing of the acquired images according to a sparse array image correlation process which comprises forming first and second image arrays of pixel values from respective first and second images, each pixel value associated with one of a number of pixels, selecting pixel values in the image arrays which are beyond a pixel threshold value, and performing a correlation process on the selected pixel values comprising creating first and second sparse image arrays of the selected pixel values and their locations in the respective first and second image arrays, performing individual correlations successively between pixel entries of the first sparse image array and pixel entries of the second sparse image array within a pixel distance of each other, and cumulating the correlations in a correlation table at respective distance entries.

18. (Original) The imaging system of Claim 16 wherein the correlation processor provides processing that includes recursive correlation.

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19. (Original) The imaging system of Claim 16 wherein the correlation processor provides correlation error correction.

20. (Original) The imaging system of Claim 16 wherein the correlation processor provides sub-pixel resolution processing.

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